



**INTERNATIONAL TRACTORS LIMITED,
SONALIKA INTERNATIONAL DI-35 SM TRACTOR**



भारत सरकार

GOVERNMENT OF INDIA

कृषि मंत्रालय (कृषि एवं सहकारिता विभाग, मशीनीकरण एवं प्रोद्योगिकी प्रभाग)
Ministry of Agriculture (Deptt. of Agri. & Co-op, Mechanization & Technology Division)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001-2008 Certified Institute)

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T- 910/1425/2014

INTERNATIONAL TRACTORS LIMITED, SONALIKA INTERNATIONAL
DI-35 SM TRACTOR- Commercial (Initial)

Manufacturer : M/s. International Tractors Limited,
Vill. Chak Gujran, P.O. Piplanwala,
Jalandhar Road,
HOSHIARPUR (Punjab) – 146 022

Test requested by (applicant) : The Manufacturer
Selected for test by : The Applicant
Place of running-in : At manufacturer's works

Duration of said running-in (h):
- Engine : 35
- Transmission : Nil

Method of Selection : The tractor was submitted directly by the
applicant for test. Hence, method of selection
is not known.

1. SPECIFICATIONS

- 1.1 Tractor:**
Make : International Tractors Limited
Model : Sonalika International DI-35 SM
Variant, if any : None
Type : Four wheeled, Rear wheel driven, Standard
Agricultural Tractor.
Year of manufacture : 2012
Chassis number : JZJSD304569SM
Country of Origin : India
- 1.2 Engine:**
Make : International Tractors Limited
Model : 3100FLS (apa)
Type : Four stroke, naturally aspirated, water cooled,
direct injection, diesel engine.
Serial number : 3100FLS23H304895F2
- Engine speed (Manufacturer's recommended production setting)(rpm):**
- Maximum speed at no load : 2150 to 2250
- Low idle speed : 650 to 750
- Speed at maximum torque : 1100 to 1300
- Rated speed, (rpm):**
- For PTO use : 2000
- For drawbar use : 2000
- 1.3 Cylinder & Cylinder Head:**
Number : Three
Disposition : Vertical, in-line
Bore/stroke, (mm) : 100 / 118
Capacity as specified by the applicant, (cc) : 2780
Compression ratio, (apa) : 19.5 (± 0.2) :1
Type of cylinder head : Individual, inline
Type of cylinder liners : Wet replaceable
Type of combustion chamber : Re-entrant cavity on piston crown
Arrangement of valves : Overhead, Inline



17. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

17.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2008 for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2008	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5	6	7
17.1.1 PTO Performance :						
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >35hp. -7.5/+10% for PTO power ≤ 35 hp	24.6 (D)	26.2	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	24.6 (D)	26.2	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	265 (D)	247	No
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	153 (D)	148.9	Yes
e)	Back-up torque, percent	Non Evaluative	7 percent, min.	7 percent, min. (R)	19.1	Yes
f) Maximum operating temperature, (°C)						
1)	Engine oil	Non Evaluative	The declared value should not exceed the max. value specified by the oil company and the observed value under high ambient condition should not exceed the declaration.	132 (D)	113	Yes
2)	Coolant (water)	Evaluative	The declared value should not exceed the boiling temperature of coolant under the pressurized or otherwise and the observed value under high ambient condition should not exceed the declaration.	118 (D)	106	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.50 (R)	0.13	Yes
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per metre or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per metre (R)	0.70	Yes



1	2	3	4	5	6	7
17.1.2 Drawbar performance :						
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	16.76 (D)	21.39	Yes
				16.19 (R) Minimum		
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	12.68 (D) Minimum	15.74	Yes
				11.86 (R) Minimum		
c)	Maximum drawbar power without ballast, (kW).	Evaluative	Min. 80% of PTO power as referred in 16.1.1 (a) of PTO performance	19.8 (D)	24.7	Yes
				21.0 (R) Minimum		
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	130 (D)	80	Yes
17.1.3 Power lift and hydraulic pump performance :						
a) Maximum lifting capacity throughout the range of lift, (kN):						
1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	10.78 (D)	9.75	Yes
2)	With the standard frame	Evaluative	The lift capacity should at least be 18 kg/PTO hp. And it should be 16 kg/engine hp where the tractor is not provided with a PTO shaft	7.84 (D)		
				6.20 (R) Minimum	8.13	Yes
b)	Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 Minutes, (mm)	Non Evaluative	[Tolerance of plus 5 mm]	50 (D)	02	Yes
17.1.4 Brake performance at 25 kmph:						
a) Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with road ballast, (m):						
1)	Cold brake	Evaluative	10	10 (R)	7.72	Yes
2)	Hot brake	Evaluative	10	10 (R)	8.07	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	248 to 252	Yes
c)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever	Evaluative	Yes / No	Yes (R)	Yes	Yes



1	2	3	4	5	6	7
17.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor, dB(A)	Evaluative	As per CMVR	88 (R)	81	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	98 (R)	92	Yes
17.1.6	Amplitude of mechanical vibrations at :					
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	100	Yes
2)	Right foot rest			100 (R)	90	Yes
3)	Seat (with driver seated)			100 (R)	120	No
4)	Steering wheel			100 (R)	210	No
17.1.7	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
1)	Two wheel	Non Evaluative	--	5.5 (D)	5.5	Yes
2)	Four wheel	Evaluative	--	6.0 (D)	6.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
1)	Two wheel	Non Evaluative	--	4.50 to 6.00 (D)	5.51	Yes
2)	Four wheel			4.50 to 6.00 (D)	5.13 to 5.29	Yes
c)	Fuel consumption (ml/km/tonne):					
1)	Two wheel	Non Evaluative	--	28 to 38 (D)	32.97	Yes
2)	Four wheel			28 to 38 (D)	31.48 to 32.49	Yes
17.1.8	Wetland cultivation :					
	Sealing for the following assemblies:	Evaluative	The identified assemblies should essentially meet the requirement of IS: 11082. No water ingress in the identified assembly given in column-2. If tractor does not meet the requirements of wetland cultivation, it may be recommended for dry land operation only.	There should be no ingress of water and/or mud (R)	No ingress of water and/or mud was observed	Yes
17.1.9	Safety features :					
a)	Guards against moving and hot parts	Evaluative	As per CMVR	At present no requirements	Provided	Yes
b)	Lighting arrangement	Evaluative	As per CMVR	--	Provided	Yes



1	2	3	4	5	6	7
17.1.10	Labelling of tractors (Provision of labelling plate):					
1)	Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	International Tractors Ltd.	Yes
2)	Model	Evaluative		--	Sonalika International DI-35 SM	Yes
3)	Year of manufacture	Evaluative		--	2012	Yes
4)	Engine serial number	Evaluative		--	3100FLS23H304895	Yes
5)	Chassis number	Evaluative		--	F2	Yes
6)	Declaration of PTO power, (kW)	Evaluative		--	JZJSD304569SM	Yes
				--	24.6	Yes
7.1.11	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	100.30	100.04	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.450	0.148 to 0.149	Yes
(c)	Ring end gap (mm):					
-	Top comp. ring.	Evaluative	-do-	2.00	0.50 to 0.60	Yes
-	2 nd comp. ring.		-do-	2.00	0.80 to 0.90	Yes
-	Oil ring.		-do-	2.00	0.60 to 0.80	Yes
(d)	Ring groove clearance (mm):					
-	Top comp. ring.	Evaluative	-do-	--	Taper rings	--
-	2 nd comp. ring.		-do-	0.150	0.053 to 0.058	Yes
-	Oil ring.		-do-	0.130	0.043 to 0.047	Yes
(e)	Clearance of main bearings (mm):					
-	Diametrical clearance	Evaluative	-do-	0.40	0.097 to 0.108	Yes
-	Crankshaft end float	Evaluative	-do-	0.60	0.23	Yes
(f)	Clearance of big end bearings, (mm):					
-	Diametrical	Evaluative	-do-	0.50	0.053 to 0.054	Yes
-	Axial	Evaluative	-do-	1.00	0.45	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	1.00	0.081 to 0.103	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	1.00	0.120 to 0.130	Yes



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17.1.12 CATEGORY OF BREAKDOWNS / DEFECTS :					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2008	As observed	Whether meets the requirements (Yes/No.)
1.	Critical	Evaluative	No critical breakdown	None	Yes
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature	None	Yes
3.	Minor	Evaluative	Not more than five and frequency of each should not be more than two.	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or 5 minor breakdowns.	None	Yes

17.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2008:				
S. No.	Characteristic	Requirements as per IS: 12207-2008	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5
1	Air cleaner oil pull over, max. Oil pull over (%)	0.25% (max.)	0.16	Yes
2.	Seating requirements	Should meet the requirements of IS: 12343-1998	Does not meet the requirement	No
3.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	--
		If ROPS fitted it should meet the requirement of IS: 11821-1992	ROPS not fitted	--
4.	Technical requirements for PTO shaft	Should meet the requirements of IS: 4931 -1995	Meets the requirement	No
5.	Dimensions of three point linkage	Should meet the requirements of IS: 4468 (Part-I)-1997	Meets the requirement	No
6.	Specifications of linkage drawbar	Should meet the requirements of IS: 12953-1990.	Meets the requirement	Yes
	Specification of swinging drawbar	Should meet the requirements of IS: 12362 Part 3-1994.	Not provided	Not applicable
7.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Provided	Yes

17.3 Conformity with following IS:

- i) Guidelines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First revision) [IS 10273:1987 (Reaffirmed in March, 2009)] : Conforms



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- ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3 (third revision)[IS: 4931-1995 (Reaffirmed in March, 2009)] : Does not conforms
- iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468(Part-I):1997 (Reaffirmed in March, 2007)] : Does not conforms
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in March, 2007)] : Conforms
- v) Agricultural tractors - Operator's seat technical requirement (First revision) [IS 12343:1998 (Reaffirmed in March, 2009)] : Does not conforms
- vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) :[IS 12239 (PT-1)-1996 (Reaffirmed in March, 2007)]/ISO 4254-1:1989] : Does not Conforms
- vii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) [(IS : 12239 (PT-2)-1999 (Reaffirmed in March, 2009))] : Does not conforms
- viii) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays [IS: 6283 (Part-1)-2006 (Reaffirmed in March, 2009) and IS:6283 (Part-2)-2007 (Reaffirmed in March, 2009)] : Does not conforms
- ix) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983 (Reaffirmed in March, 2009))] : Conforms
- x) Agricultural Tractor & Machinery Lighting device for travel on public roads [(IS: 14683-1999 (Reaffirmed in March, 2009))] :

17.4 Salient Observations:

17.4.1 Laboratory tests:

17.4.1.1 PTO Performance:

The specific fuel consumption corresponding to maximum power was measured as 265 g/kWh against the declaration of 247 g/kWh, which does not meet the requirement of IS: 12207-2008 with regard to tolerance. This should be looked into for necessary corrective action.

17.4.1.2 Drawbar performance:

During drawbar performance test, rear tyre creeping was observed as 15 mm & 55 mm for LHS and RHS tyres respectively which is on higher side and calls for necessary corrective action.

17.4.1.3 Hydraulic Performance:

The maximum angle of mast of lift from vertical was observed as 7.5 degrees only against the requirement of minimum 10.0 degrees and which does not meet the requirement of IS: 12224-1987. This should be looked into for necessary corrective action.



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INTERNATIONAL TRACTORS LIMITED, SONALIKA INTERNATIONAL
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The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter-9 of this test report is on higher side, especially at the operator's seat and steering control wheel. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

17.4.1.5 Three point linkage:

- The diameter of hitch pin hole of upper hitch points & lateral distance from lower hitch point to center line of tractor does not meet the requirements of IS: 4468(Part I)-1997. This should be looked into for necessary corrective action.
- Some of the parameters of the three point linkage conform to Cat. I and some of them conform to Cat.II. Keeping in view of the spirit of standardization, the necessary improvements may be incorporated.

17.4.1.6 Specifications of Power Take-off Shaft:

The dimension "d ϕ " & "a" of (Refer Fig.2) of PTO shaft does not meet the requirement of IS: 4931:1995. This should be looked into for necessary corrective action.

17.4.1.7 Operator's Seat:

The Inclination of seat towards rear direction does not meet the requirements of IS: 12343-1998. This should be looked into for necessary corrective action.

17.4.1.8 Symbols of operator's control and other displays:

The symbol of fuel level (1/4, 1/2, 3/4, full) has not been provided on fuel level gauge as per IS: 6283 (Part-2)-2007. This should be looked into for necessary corrective action.

17.4.2 Wetland operation (Puddling operation):

No ingress of mud and / or water was noticed during puddling operation of the tractor and meet the requirements of IS: 11082-1984 (Technical requirements of agricultural tractors for wetland operation). Therefore, the tractor is recommended as suitable for wetland operation (Puddling).

17.5 Maintenance / Service Problems:

No noticeable maintenance or service problem was observed during the test.

17.6 Recommendation with regard to safety on tractor:

The following requirements, inter alia, may be considered for incorporation on the tractor:

- Provision of safety against accidental start of the engine.
- Provision for spark arresting device in exhaust system.
- Provision for retaining the fuel shut-off lever in "STOP" position.
- Provision of PTO shaft master shield.
- Differential lock may be provided.

17.7 Adequacy of Literature supplied with machine:

The following literature has been supplied with the tractor

- Operator's manual (For Sonalika International DI-35 SM tractors).
- Service manual (For Sonalika International DI-35 SM tractors).
- Spare part's catalogue (For Sonalika International DI-35 SM tractors).



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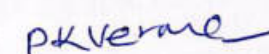
- 17.7.1 The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

18. CITIZEN CHARTER

Time frame for Testing & Evaluation as per Citizen Charter	Duration of Test	Whether the Test Report is released within the time frame given in Citizen Charter	Remarks
10 Months	9 Months (April, 2013 to January, 2014)	Yes	None

TESTING AUTHORITY:


C. V. CHIMOTE
TEST ENGINEER


P. K. VERMA
SENIOR AGRICULTURAL ENGINEER


C. R. LOHI
DIRECTOR

Test Report compiled by: Shri. Pramod Yadav, Senior Technical Assistant.

19. Applicant's Comments

Para No.	Our Reference	Applicant's comments
19.1	1.13.2 (I-a) & (III), 1.14.1, 1.20.1, 1.20.2, 17.2 (2,4,5), 17.3 (ii, iii,v), 17.4.1.5, 17.4.1.6, 17.4.1.7	We will look into for corrective actions.
19.2	1.20.3, 1.20.4 (i,iii), 1.20.5, 17.3(vi,vii,viii,ix), 17.4.1.8, 17.6	We will look into for implementation of these safety features.
19.3	17.1.1(c), 17.1.6(3,4), 17.3(i), 17.4.1.1, 17.4.1.2, 17.4.1.3, 17.4.1.4	We will look into for corrective actions.